According to Bentley's Column 3, Lines 33-35, "The gas then passes into an electrostatic precipitator where **droplets of mist still remaining in the gas stream are substantially removed**". The few remaining droplets are clearly neither intended nor sufficient to effectuate "substantially full wetting of the inner surface of said tube", as required by the amended claims 2 and 6. Moreover, since these few residual droplets would not suffice for Bentley's precipitator to function as a wet electrostatic precipitator, the latter would not meet the requirement of Line 1 of our amended claims 1 and 5.

To summarize, as was noted above, Bentley's Fig. 1, which shows an analyzer 23 appropriate for air monitoring applications, does not include any electrostatic precipitator and no such precipitator is mentioned in its accompanying textual disclosure. It was also shown above, that the electrostatic precipitator of Bentley's Fig. 3 does not constitute any essential part of Bentley's baffle separation invention, but is merely a coincidental adjunct of a final clean-up step which could not in any reasonable way comprise "a gas- and liquid-containing chamber" and "means for introducing an analyte-free collection liquid into said chamber" as called for in our basic claims 1 and 5. This refutes all the arguments that Bentley et al. disclose or teach the apparatus of Claim 1 or 5. Hence the rejections based on these arguments should be rescinded and **all the rejections based on 35 USC § 103 should be withdrawn from Claims 1-3, 5, and 9-19.**

As to the rejection of our **Claims 2, 3, 6, and 7** based on Bentley's following sentence: "A mist created by a piezoelectric ultrasonic transducer is contacted with the gas and both gas and mist are passed through baffled separators" (Column 1, Lines 47-50), it must be noted that **the sentence refers explicitly to "baffled separators" and not to any collector electrode tube** and that **the function of Bentley's mist is not to wet any inner walls but rather to react with or absorb solid and gaseous materials from the gas stream (Column 1, Lines 51-53).** The argument that a residual portion of mist reaches the electrostatic precipitator of Bentley's Fig. 3 falls apart in view of our above demonstrations that the cited precipitator is irrelevant to our claims. The same applies to the objection to **Claim 9.** It is therefore respectfully submitted that the objections to these claims based on 35 USC § 102 appear to have been refuted likewise.

Since the disclosures pertaining to Bentley's Figs. 1 and 2 do not deal with an electrostatic precipitation system, whereas those of Fig. 3 are inapplicable for the above reasons, the objections based on 35 USC § 103 to our basic Claims 1 and 5 and their subsidiary claims should be removed.

Examiner's §15-19, Pages 5-6, repeat the misstatements about Bentley's electrostatic precipitator and cite vertical electrostatic precipitators in the Grindell and Hardt patents. However, **merely citing disjoint elements from various patents cannot form a basis for an obviousness rejection. Could a sling be claimed not to have been an invention because it was made up of well known pieces of a branch, a string, and a pebble? It is the manner in which the pieces are put together and used that constitutes the invention.** Similarly, the incidental electrostatic precipitator of Bentley's Fig. 3, unrelated to their analyte collection

method, or the cited and uncited host of other electrostatic precipitators which have no bearing on air contaminant detection cannot have rendered our claims obvious.

Examiner's §20, Pages 6-9:

"Claim 2 (Page 6): The apparatus of claim 1, comprising means for introducing a *fine mist of droplets into said collector tube so as to cause substantially full wetting of the inner surface of said tube by a liquid film*. (See Bentley et al.; Column 1 lines 48-49 & Column 3 lines 33-35)", which read (Column 1 lines 48-49): "A mist created by a piezoelectric ultrasonic transducer is contacted with the gas and both gas and mist are passed through baffled separators" and (Column 3 lines 33-35): "The gas then passes into an electrostatic precipitator where droplets of mist still remaining in the gas stream are substantially removed." It is clear from the cited Column 1 lines 48-49 that Bentley's mist is passed through their "baffled separators" and not through a collector tube, and from the cited Column 3 lines 33-35 that the electrostatic precipitator of their Fig. 3 could not have *substantially full wetting of the inner surface* [as in our claim 2] with the few droplets of mist still remaining to be substantially removed.

The same applies to "Claim 3 (Page 6): Wherein said mist is generated by an ultrasonic humidifier. (See Bentley et al.; Column 1 lines 48-49)" and to Claims 6 & 7, *Examiner's §21-23, Pages 9-10.*

Moreover, it is noteworthy that Bentley's mist does not to wet any inner walls but rather reacts with or absorbs solid and gaseous materials from the gas stream and winds up collecting as enlarged droplets in a reservoir and not on any tube walls. See Column 2, Lines 54-64, which read:

> "Certain gaseous components of the gas entering through nozzle 25 will react with the liquid or be absorbed by the liquid as the gas and mist pass through mixing zone 3. These are the materials which, along with particulate material, if any, are to be detected and measured and/or removed from the gas. As the gas and mist pass through separation zone 12, **mist droplets agglomerate to sizes too large to be carried by the gas stream** through zone 12 and space 30 and into separation zone 13. **These droplets of liquid collect in the reservoir 16.**"

Re Claims 12-14 (Page 8): As pointed out above, Bentley's Figs. 1 and 2 are not relevant to any detection apparatus or method because they don't deal with electrostatic precipitation but solely with "baffled separators;" and the incidental precipitator of their Fig. 3 is related to removal of droplets but not to any detection method. Grindell's invention involves "ascertaining the smoke content in a flow of gaseous fluid" by measuring "the total electric charge of the particles which strike" an "electrode per time unit" (Column 1, Lines 56-63). His disclosure does not include any "capturing for detection" of "aerosolized particles as small as 0.01 micron in size "as specified in our Claim 12. Therefore, neither of these references can provide a basis for a 35 USC § 103 rejection.

Moreover, as to the objection to **Claims 12-14**, we not only find no mention of "an electrostatic precipitation-based aerosol collector" in Bentley's Summary of Invention or Column 1, Lines 23-36 or Column 2, Lines 10-17, but the "piezoelectric ultrasonic transducer" found in these citations serves to generate mist

particles but not to capture them. However, claim 12 has been further amended to start with the wording "A method of capturing for detection..." which again excludes from consideration the electrostatic precipitator of Bentley's patent. Objections based on the argument that electrostatic precipitators capture sub-micron-size particles would be valid for applications pertaining to air scrubbing, such as those of Bentley's Fig. 3, but not to capture for detection, which is a new application of such precipitators. It is to be noted that most existing aerosol collectors intended for monitoring of hazardous air contaminants can not capture sub-micron-size particles with the efficiency that is required for their ultra-sensitive detection. Any virus particles that they collect are mostly those which are attached to larger carriers, such as water droplets or dust particles, or are agglomerated into larger sizes. Since individual virus particles or their smaller agglomerates remain afloat in air for longer times and in larger numbers than the larger carriers or agglomerates, their efficient collection greatly enhances their detection sensitivity and thus opens the way to timely detection of hazardous viruses, such as those of pandemic influenza. The realization of the importance of such new detection capability constitutes a novel discovery which should qualify for patent protection.

It is therefore believed that the amended claims overcome the objections based on 35 USC § 102.

Re Claims 16-18 (Pages 8-9): There is no mention in the cited Grindell's Column 3, Lines 49-60, of a liquid film at least 25 microns thick. The Hardt reference deals with "an electrostatic precipitator of the wet type, formed with tubular passages through which the gas to be purified is induced to flow" and does not even mention the word "detection" in its entire disclosure.

Re Claim 19 (Page 9): Our above refutation of the rejection of Claim 1 applies a fortiori to Claim 19.

Re Claim 15 (*Examiner's §24-25*, Page 10): Our above refutation of the rejection of Claim 1 applies a fortiori to Claim 15.

Re Claims 4, 8, & 20 (*Examiner's §26-34*, Pages 10-12):

The cited Liu's Column 10, Lines 13-32, read as follows:

> "Although the precipitator described in this invention is intended for droplet aerosol collection, it can also be used to collect aerosols containing only dry solid particles. To prevent the build up of solid particles in the porous collecting electrode which will cause plugging of the pores, liquid droplets, usually water, can be added to the aerosol before it is introduced into the precipitator. FIG. 5 shows an **ultrasonic droplet generator 80 used in conjunction with an electrostatic precipitator 82 for droplet addition. As aerosol flows from source 84 through the ultrasonic generator 80, it picks up droplets in the space 86 above an agitated liquid 88 produced by ultrasonic agitation using an ultrasonic transducer 89.** The dry particulate matter will be precipitated along with the added liquid droplets in the precipitator 82 and be carried away by the liquid stream resulting from the collected droplets, thereby preventing the build up of dry solid material on the collecting electrode in the precipitator. Other droplet generating devices, such as compressed air atomizer, bubblers, and the like can also be used. The electrostatic precipitator can be made as shown in any of the forms disclosed. "

Now our Claim 4 specifies "***means for generating and transmitting ultrasonic waves across the interface between said tube and said liquid film***" which does not appear in the above citation from Liu's patent. Liu's "**ultrasonic droplet generator**" is used "**for droplet addition**" to an aerosol flowing "**through the ultrasonic generator 80..... in the space 86 above an agitated liquid 88 produced by ultrasonic agitation**" (Lines 18-24) and does not generate or transmit waves across the interface between a collector tube and an adhering liquid film. **Therefore, Liu's teachings are no more relevant to our claims 4, 8, and 20 than are Bentley's, Grindell's or Hardt's.**

It is therefore requested that all the amended claims be found to be allowable.

Respectfully submitted by,

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